

## PATENT COOPERATION TREATY

PCT

NOTIFICATION CONCERNING  
SUBMISSION OR TRANSMITTAL  
OF PRIORITY DOCUMENT

(PCT Administrative Instructions, Section 411)

From the INTERNATIONAL BUREAU

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To:

FEB 07 2001

KASPER, Alan, J. Technology Center 2600  
Sughrue, Mion, Zinn, MacPeak &  
Seas, PLLC  
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Washington, DC 20037-3202  
ETATS-UNIS D'AMERIQUE

|   |   |
|---|---|
| Date of mailing (day/month/year)<br>18 September 2000 (18.09.00)              |   |
| Applicant's or agent's file reference<br>F123422                              | IMPORTANT NOTIFICATION  |
| International application No.<br>PCT/US98/14195                               | International filing date (day/month/year)<br>15 July 1998 (15.07.98) |
| International publication date (day/month/year)<br>28 January 1999 (28.01.99) | Priority date (day/month/year)<br>15 July 1997 (15.07.97)             |
| Applicant<br>COMSAT CORPORATION et al   |   |

1. The applicant is hereby notified of the date of receipt (except where the letters "NR" appear in the right-hand column) by the International Bureau of the priority document(s) relating to the earlier application(s) indicated below. Unless otherwise indicated by an asterisk appearing next to a date of receipt, or by the letters "NR", in the right-hand column, the priority document concerned was submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b).
2. This updates and replaces any previously issued notification concerning submission or transmittal of priority documents.
3. An asterisk(\*) appearing next to a date of receipt, in the right-hand column, denotes a priority document submitted or transmitted to the International Bureau but not in compliance with Rule 17.1(a) or (b). In such a case, **the attention of the applicant is directed** to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.
4. The letters "NR" appearing in the right-hand column denote a priority document which was not received by the International Bureau or which the applicant did not request the receiving Office to prepare and transmit to the International Bureau, as provided by Rule 17.1(a) or (b), respectively. In such a case, **the attention of the applicant is directed** to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

| <u>Priority date</u>    | <u>Priority application No.</u> | <u>Country or regional Office<br/>or PCT receiving Office</u> | <u>Date of receipt<br/>of priority document</u> |
|-------------------------|---------------------------------|---|---|
| 15 July 1997 (15.07.97) | 60/052,539                      | US  | 27 July 2000 (27.07.00)                         |

The International Bureau of WIPO  
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1211 Geneva 20, Switzerland

Facsimile No. (41-22) 740.14.35

Authorized officer

C. Cupello

Telephone No. (41-22) 338.83.38

## PATENT COOPERATION TREATY

PCT

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

United States Patent and Trademark  
Office  
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in its capacity as elected Office

|  |  |
|--|--|
| <b>Date of mailing (day/month/year)</b><br>10 March 1999 (10.03.99)          |  |
| <b>International application No.</b><br>PCT/US98/14195                       | <b>Applicant's or agent's file reference</b><br>F123422          |
| <b>International filing date (day/month/year)</b><br>15 July 1998 (15.07.98) | <b>Priority date (day/month/year)</b><br>15 July 1997 (15.07.97) |
| <b>Applicant</b><br>CHITRE, Dattakumar, M. et al                             |  |

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:

09 February 1999 (09.02.99)

☐ in a notice effecting later election filed with the International Bureau on:2. The election ☒ was☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

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Sean Taylor

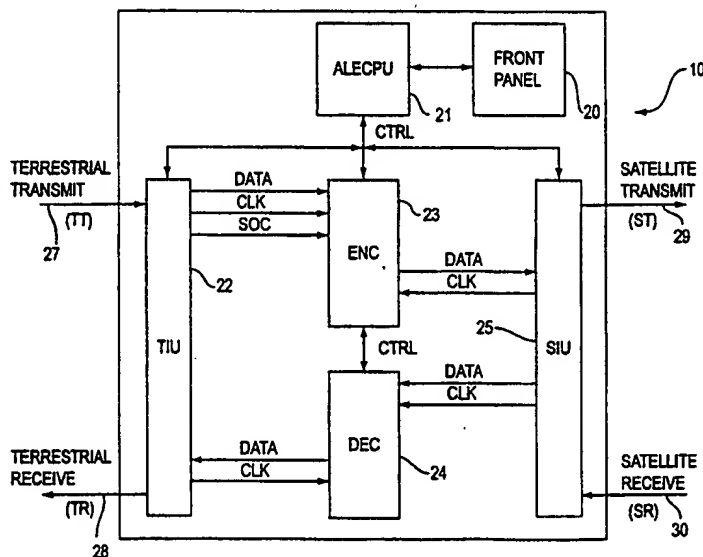
Telephone No.: (41-22) 338.83.38



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

|  |  |   |  |
|--|--|---|--|
| (51) International Patent Classification <sup>6</sup> :<br><b>G06F 11/10, H04J 3/06, 3/26, H04L 12/46, 12/56</b>   |  | <b>A3</b>   | (11) International Publication Number:<br><b>WO 99/04339</b>       |
|  |  |   | (43) International Publication Date:<br>28 January 1999 (28.01.99) |
| (21) International Application Number:<br><b>PCT/US98/14195</b>  |  | (81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, <u>ARIPO</u> patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). |  |
| (22) International Filing Date:<br>15 July 1998 (15.07.98)   |  | Published<br>With international search report.  |  |
| (30) Priority Data:<br>60/052,539 15 July 1997 (15.07.97) US   |  | (88) Date of publication of the international search report:<br>8 April 1999 (08.04.99)   |  |
| (71) Applicant (for all designated States except US): COMSAT CORPORATION [US/US]; 6560 Rock Spring Drive, Bethesda, MD 20817 (US).   |  |   |  |
| (72) Inventors; and<br>(75) Inventors/Applicants (for US only): <u>CHITRE</u> , Dattakumar, M. [US/US]; 14921 Notley Road, Silver Spring, MD 20905 (US); <u>AGARWAL</u> , Anil, K. [US/US]; 409 Midsummer Drive, Gaithersburg, MD 20878 (US); <u>GOWRISANKARAN</u> , Prabhakar [IN/US]; Apartment 5, 18616 Walker Choice Road, Gaithersburg, MD 20878 (US); <u>LUNSFORD</u> , John, Albert [US/US]; 206 Kent Oaks Way, Gaithersburg, MD 20878 (US); <u>NARAYANASWAMY</u> , Sathyanarayanan [IN/US]; Apartment 10, 12909 Churchill Ridge Circle, Germantown, MD 20874 (US). |  |   |  |
| (74) Agents: KASPER, Alan, J. et al.; Sughrue, Mion, Zinn, MacPeak & Seas, PLLC, Suite 800, 2100 Pennsylvania Avenue, N.W., Washington, DC 20037-3202 (US).  |  |   |  |

(54) Title: METHOD AND APPARATUS FOR IMPROVING ASYNCHRONOUS TRANSFER MODE OPERATION OVER NOISY, HIGH SPEED WIRELESS LINKS



## (57) Abstract

An apparatus (10) for receiving an ATM cell stream sequence via a wireline link, encoding the ATM cell stream for transmission of data via a wireline link, receiving and decoding encoded wireless data received via wireless link and transmitting another ATM cell stream sequence via wireline link, comprising: a wireless interface (22), an encoder (23) including a cell preprocessor (40), a frame assembler (41), a RS encoder (42), and a byte interleaver (43), a decoder (24) including an acquisition and synchronization unit (50), a byte deinterleaver (51), a RS decoder (52), and a cell assembler (53), a wireless interface (25), and a control unit (21).

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

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| EE | Estonia                  | LR | Liberia             | SG | Singapore             |    |                          |

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US98/14195

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(6) : G06F 11/10; H04J 3/06, 3/26; H04L 12/46, 12/56

US CL : 370/349, 350, 394, 395, 471, 474, 477, 514; 371/37.02, 37.11

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

U.S. : Please See Extra Sheet.

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
NONEElectronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
Please See Extra Sheet.**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category* | Citation of document, with indication, where appropriate, of the relevant passages  | Relevant to claim No.        |
|-----------|---|------------------------------|
| X, P      | US 5,657,316 A (NAKAGAKI ET AL) 12 August 1997, see col. 4, line 30 to col. 5, line 23, col. 5, line 61, to col. 7, line 43, col. 8, line 26 to col. 10, line 14, col. 11, lines 23-41. | 14, 18, 30                   |
| Y         | US 5,570,362 A (NISHIMURA) 29 October 1996, see col. 4, line 46 to col. 5, line 54, col. 6, line 32 to col. 7, line 49, col. 9, line 22 to col. 11, line 7.                             | 1-13, 15-17, 19-29, 31-39    |
| Y         | US 5,608,738 A (MATSUSHITA) 04 March 1997, see col. 4, line 45 to col. 5, line 62.  | 6, 9, 24                     |
| Y         | US 5,600,653 A (CHITRE ET AL) 04 February 1997, see col. 3, lines 4-64, col. 7, line 53 to col. 9, line 16.   | 10-12, 17, 27, 31, 32, 34-39 |

☒ Further documents are listed in the continuation of Box C.
 ☐ See patent family annex.

|   |  |
|---|--|
| * Special categories of cited documents:  | *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention  |
| *A* document defining the general state of the art which is not considered to be of particular relevance  | *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone   |
| *E* earlier document published on or after the international filing date  | *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art |
| *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) | *A* document member of the same patent family  |
| *O* document referring to an oral disclosure, use, exhibition or other means  |  |
| *P* document published prior to the international filing date but later than the priority date claimed  |  |

Date of the actual completion of the international search

09 DECEMBER 1998

Date of mailing of the international search report

02 FEB 1999

 Name and mailing address of the ISA/US  
 Commissioner of Patents and Trademarks  
 Box PCT  
 Washington, D.C. 20231

Facsimile No. (703) 305-3230

Authorized officer

ALPUS H. HSU

Telephone No. (703) 305-4377

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US98/14195

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages  | Relevant to claim No. |
|-----------|---|-----------------------|
| Y         | US 4,346,470 A (ALVAREZ, III ET AL) 24 August 1982, see col. 2, line 47 to col. 3, line 19, col. 61, line 12 to col. 63, line 46. | 33                    |
| A         | US 5,553,069 A (UENO ET AL) 03 September 1996, see entire document.   | 1-39                  |
| A         | US 5,434,854 A (FOCARILE ET AL) 18 July 1995, see entire document.  | 1-39                  |

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US98/14195

## B. FIELDS SEARCHED

Minimum documentation searched

Classification System: U.S.

370/338, 349, 350, 389, 394, 395, 400, 401, 470, 471, 474, 477, 503, 506, 509, 514, 516; 371/37.01, 37.02, 37.07, 37.11, 37.12, 42, 43.1, 46, 47.1; 375/362, 364; 455/450, 451, 452, 67.1, 67.6

## B. FIELDS SEARCHED

Electronic data bases consulted (Name of data base and where practicable terms used):

APS search terms: (asynchronous transfer mode or atm), (cell# or packet#), header, payload, frame(p)assembl?, (error correction code or ecc), encod?, decod?, (byte# or bit#), nibble#, flag?, parity, sequence#, sync?(w)pattern#, syndrome, reed(w)solomon, interleav?, deinterleav?, acquisition, synchronization, (idle or unassign?)(p)(packet# or cell#), (matrix or matrices)

## BOX II. OBSERVATIONS WHERE UNITY OF INVENTION WAS LACKING

This ISA found multiple inventions as follows:

This application contains the following inventions or groups of inventions which are not so linked as to form a single inventive concept under PCT Rule 13.1. In order for all inventions to be searched, the appropriate additional search fees must be paid.

Group I, claim(s) 1-9, 13, 19-29, drawn to a method for encoding ATM cells over wireless link.

Group II, claim(s) 10-12, 15-17, 31-33, drawn to a method and apparatus for transmitting ATM cells received from wireline link over wireless link.

Group III, claim(s) 14, 18, 30, drawn to a method for recording information to be used at receiving end of an ATM wireless link for restoring frame in sequence.

Group IV, claim(s) 34-39, drawn to a method for decoding interleaved and encoded data over wireless link.

The inventions listed as Groups I-IV do not relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: Groups I-IV are related as combination and subcombinations. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombinations as claimed for patentability, and (2) that each subcombination has utility by itself or in other combinations (MPEP 806.05(c)). In this instant case, the combination as claimed does not require the particulars of the subcombinations as claimed for patentability, and that each subcombination has utility by itself such as an ATM cell encoding device for Group I, ATM SAR device for Group III, and an ATM cell decoding device for Group IV.

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US98/14195

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2. ☐ Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Please See Extra Sheet.

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.  
☐ No protest accompanied the payment of additional search fees.



payload frames.

13. A method for storing information to be used by a receiving end of a wireless link relating to dynamic real time changes in encoding between an ATM frame to be transmitted over said wireless link and a subsequent ATM frame to be transmitted over said wireless link comprising:

encoding a plurality of ATM cells, wherein said encoding step includes the steps of:

detecting idle/unassigned cells within said cell stream,

assembling an ATM frame having a header frame made up of headers of a first predetermined number of said plurality of ATM cells and a payload frame made up of payloads of said first predetermined number of said plurality of ATM cells,

placing up to a second predetermined number of the detected idle/unassigned cells in a selected portion of the payload frame, and

adding Payload Error Correction Code to those idle/unassigned cells which are placed in said selected portion of said payload frame; and

storing an idle/unassigned cell indicator in a first control byte in said header frame to be transmitted over said wireless link which indicates whether or not idle/unassigned cells have been placed at said selected portion of said payload frame; and

storing a count of the number of idle/unassigned cells contained in the payload frame in a second control byte within said header frame.

data and outputting said another cell stream sequence to said wireline interface; and

20       a control unit for controlling said interfaces, encoder and decoder.

32. An apparatus according to claim 31, wherein said encoder further comprises:

5       a cell preprocessor for receiving said cell stream data, monitoring header bytes of incoming cells, detecting idle/unassigned cells and outputting cell data;

      a frame assembler receiving said cell data from said cell preprocessor; assembling said data in a frame and outputting said frame;

10       an encoder for receiving said frame and encoding said frame according to a predetermined coding scheme;

      and an interleaver for interleaving and transmitting said frame to said wireless interface.

33. An apparatus according to claim 31, wherein said decoder further comprises:

5       an acquisition and synchronization unit for receiving previously encoded cell data from said wireless interface, searching for a predetermined synchronization pattern in said previously encoded cell data, declaring a synchronization pattern, and outputting interleaved cell data;

10       a byte deinterleaver for deinterleaving said interleaved cell data received from said acquisition and synchronization unit, deinterleaving said interleaved cell data and outputting

deinterleaved cell data;

a decoder for decoding said deinterleaved cell data received from said byte deinterleaver according to a predetermined coding scheme and outputting decoded cell data;

15 and a cell assembler for receiving said decoded cell data; assembling the decoded cell data into said another cell stream sequence, and outputting said another cell stream data to said wireline interface for transmission via said wireline link.

34. A method for decoding interleaved and encoded data received over a wireless link comprising:

detecting a predetermined synchronization pattern in said encoded cells received over said wireless link;

5 passing said data to a deinterleaver and decoder when said predetermined synchronization pattern has been detected;

determining a number of bytes in error in said data; and

10 declaring a synchronization mode when the number of bytes in error between successive synchronization patterns is less than a predetermined number.

35. A method according to claim 34, wherein said step of detecting includes setting a pattern search window of a predetermined number of bytes.

36. A method according to claim 34 further comprising a step of declaring an identification of said synchronization pattern when a predetermined number of bytes of data are detected as matching said predetermined synchronization pattern.

37. A method according to claim 36, wherein said predetermined number of bytes is two.

38. A method for decoding interleaved and encoded data transmitted and received over a wireless link comprising:

deinterleaving said data and rearranging said data into a predetermined frame;

5 decoding said data according to a predetermined coding scheme;

detecting if any cells within a Header frame within said predetermined frame are uncorrectable; and

10 replacing detected uncorrectable cells with idle/unassigned cells.

39. A method according to claim 38, wherein said step of rearranging said data further comprising:

checking control bytes contained with said Header frame to determine whether or not idle/unassigned cells were utilized for error correction in a Payload Frame within said predetermined frame;

reading a plurality of header bytes within said Header frame and forming a table of sequence numbers based upon said read header bytes;

10 reinserting idle/unassigned cells into said into correct positions in said predetermined frame based upon said table of sequence numbers thereby restoring an order of cells occurring at a transmitting end of said wireless link.

## PCT

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## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

|  |  |  |
|--|--|--|
| Applicant's or agent's file reference<br>F123422   | FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416) |  |
| International application No.<br>PCT/US98/14195  | International filing date (day/month/year)<br>15 JULY 1998   | Priority date (day/month/year)<br>15 JULY 1997 |
| International Patent Classification (IPC) or national classification and IPC<br>Please See Supplemental Sheet. |  |  |
| Applicant<br>COMSAT CORPORATION  |  |  |

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 6 sheets.
- ☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority. (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
- These annexes consist of a total of 4 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of report with regard to novelty, inventive step or industrial applicability
- IV ☒ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

|  |   |
|--|---|
| Date of submission of the demand<br><br>09 FEBRUARY 1999   | Date of completion of this report<br><br>29 OCTOBER 1999                                    |
| Name and mailing address of the IPEA/US<br>Commissioner of Patents and Trademarks<br>Box PCT<br>Washington, D.C. 20231<br><br>Facsimile No. (703) 305-3230 | Authorized officer<br>ALPUS H. HSU <i>For Eugene Zenger</i><br>Telephone No. (703) 305-4377 |

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US98/14195

**I. Basis of the report**

1. This report has been drawn on the basis of *(Substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments):*

- ☐ the international application as originally filed.
- ☒ the description, pages (See Attached) , as originally filed.  
pages \_\_\_\_\_ , filed with the demand.  
pages \_\_\_\_\_ , filed with the letter of \_\_\_\_\_ .  
pages \_\_\_\_\_ , filed with the letter of \_\_\_\_\_ .
- ☒ the claims. Nos. (See Attached) , as originally filed.  
Nos. \_\_\_\_\_ , as amended under Article 19.  
Nos. \_\_\_\_\_ , filed with the demand.  
Nos. \_\_\_\_\_ , filed with the letter of \_\_\_\_\_ .  
Nos. \_\_\_\_\_ , filed with the letter of \_\_\_\_\_ .
- ☒ the drawings. sheets/~~fig~~ (See Attached) , as originally filed.  
sheets/~~fig~~ \_\_\_\_\_ , filed with the demand.  
sheets/~~fig~~ \_\_\_\_\_ , filed with the letter of \_\_\_\_\_ .  
sheets/~~fig~~ \_\_\_\_\_ , filed with the letter of \_\_\_\_\_ .

2. The amendments have resulted in the cancellation of:

- ☒ the description, pages NONE .
- ☒ the claims, Nos. NONE .
- ☒ the drawings, sheets/~~fig~~ NONE .

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the ~~Supplemental Box~~ Additional observations below (Rule 70.2(c)).

4. Additional observations, if necessary:

NONE

**IV. Lack of unity of invention**

1. In response to the invitation to restrict or pay additional fees the applicant has:

- ☐ restricted the claims.
- ☒ paid additional fees.
- ☐ paid additional fees under protest.
- ☐ neither restricted nor paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- ☐ complied with.
- ☒ not complied with for the following reasons:

This application contains the following inventions or groups of inventions which are not so linked as to form a single inventive concept under PCT Rule 13.1. In order for all inventions to be searched, the appropriate additional search fees must be paid.

Group I, claim(s) 1-9, 13, 19-29, drawn to a method for encoding ATM cells over wireless link.

Group II, claim(s) 10-12, 15-17, 31-33, drawn to a method and apparatus for transmitting ATM cells received from wireline link over wireless link.

Group III, claim(s) 14, 18, 30, drawn to a method for recording information to be used at receiving end of an ATM wireless link for restoring frame in sequence.

Group IV, claim(s) 34-39, drawn to a method for decoding interleaved and encoded data over wireless link.

The inventions listed as Groups I-IV do not relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: Groups I-IV are related as combination and subcombinations. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombinations as claimed for patentability, and (2) that each subcombination has utility by itself or in other combinations (MPEP 806.05(c)). In this instant case, the combination as claimed does not require the particulars of the subcombinations as claimed for patentability, and that each subcombination has utility by itself such as an ATM cell encoding device for Group I, ATM SAR device for Group III, and an ATM cell decoding device for Group IV.

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

- ☒ all parts.
- ☐ the parts relating to claims Nos. . .

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US98/14195

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. STATEMENT**

|                               |   |     |
|-------------------------------|---|-----|
| Novelty (N)                   | Claims <u>1-39</u>                      | YES |
|                               | Claims <u>NONE</u>                      | NO  |
| Inventive Step (IS)           | Claims <u>13, 14, 18, 30</u>            | YES |
|                               | Claims <u>1-12, 15-17, 19-29, 31-39</u> | NO  |
| Industrial Applicability (IA) | Claims <u>1-39</u>                      | YES |
|                               | Claims <u>NONE</u>                      | NO  |

**2. CITATIONS AND EXPLANATIONS**

Claims 1-4, 10-12, 19-22, 25, 28, 29, 31 and 32 lack an inventive step under PCT Article 33(3) as being obvious over U.S. Patent No. 5,570,362 to Nishimura. Nishimura discloses a method and apparatus for encoding/decoding ATM cells for data transmission/reception over communication links by assembling/disassembling header and payload frame (col. 4, line 46 to col. 5, line 54, col. 6, line 32 to col. 7, line 49, col. 9, line 22 to col. 11, line 7) as in claims 1-4, 10-12, 19-22, 25, 28, 29, 31 and 32. But Nishimura fails to disclose the feature of detecting idle or unassigned cells to be placed in selected portion of the payload frame which is well known and well within the level of skilled artisan to implement in the system of Nishimura for frame format rearrangement purpose.

Claims 5-9, 15, 16, 23, 24, 26 lack an inventive step under PCT Article 33(3) as being obvious over U.S. Patent No. 5,570,362 to Nishimura in view of U.S. Patent No. 5,608,738 to Matsushita. Nishimura fails to disclose the feature of utilizing header/payload error correction code and Reed-Solomon coding scheme as in claims 5-9, 15, 16, 23, 24, 26 which are well known error correction code and coding scheme and commonly used for error correction purpose. Matsushita, for example, from the similar field of endeavor, provides such code and coding scheme (col. 4, line 45 to col. 5, line 62) as claimed which can be easily adopted by one skilled artisan to implement in the system of Nishimura for error correction purpose.

Claim 33 lacks an inventive step under PCT Article 33(3) as being obvious over U.S. Patent No. 5,570,362 to Nishimura in view of U.S. Patent No. 4,346,470 to Alvarez, III et al. Nishimura fails to disclose the feature of an acquisition and synchronization unit for searching and declaring synchronization pattern as in claim 33 which is also well known in the art and commonly used in data communications field for data acquisition and synchronization purpose. Alvarez, III et al., for example, provides such teaching of an acquisition and synchronization unit for searching and declaring synchronization pattern (col. 2, line 47 to col. 3, line 19, col. 61, line 12 to col. 63, line 46) as (Continued on Supplemental Sheet.)



**Supplemental Box**

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Boxes I - VIII

Sheet 10

**CLASSIFICATION:**

The International Patent Classification (IPC) and/or the National classification are as listed below:

IPC(6): G06F 11/10; H04J 3/06, 3/26; H04L 12/46, 12/56 and US Cl.: 370/349, 350, 394, 395, 471, 474, 477, 514; 371/37.02, 37.11

**I. BASIS OF REPORT:**

This report has been drawn on the basis of the description,  
pages, 1-31, as originally filed.  
pages, NONE, filed with the demand.  
and additional amendments:  
NONE

This report has been drawn on the basis of the claims,  
numbers, 1-12, 14-31, as originally filed.  
numbers, NONE, as amended under Article 19.  
numbers, NONE, filed with the demand.  
and additional amendments:  
Claims 13, 32-39, filed with the letter of 16 August 1999

This report has been drawn on the basis of the drawings,  
sheets, 1-7, as originally filed.  
sheets, NONE, filed with the demand.  
and additional amendments:  
NONE

**V. 2. REASONED STATEMENTS - CITATIONS AND EXPLANATIONS (Continued):**

claimed, which can be easily adopted by one skilled artisan to implemented in the system of Nishimura to improve the system efficiency.

Claims 17, 27, 34-39 lack an inventive step under PCT Article 33(3) as being obvious over U.S. Patent No. 5,570,362 to Nishimura in view of U.S. Patent No. 5,608,738 to Matsushita and further in view of U.S. Patent No. 5,600,653 to Chitre et al.. The system or method provided from the teaching of Nishimura in view of Matsushita also fails to disclose the feature of providing header syndrome or synchronization pattern for well known error detection and correction and synchronization control purposes. Chitre et al., for example, provides such feature of providing header syndrome or synchronization pattern in the signal frame (col. 3, lines 4-64, col. 7, line 53 to col. 9, line 16) as claimed, which can be easily adopted by one skilled artisan to implement in the system or method provided from the teaching of Nishimura in view of Matsushita to improve the system reliability purpose.

Claim 13 meets the criteria set out in PCT Article 33(2)-(4), because the prior art does not teach or fairly suggest a method for storing information used by a receiving end of a wireless link relating to dynamic real time changes in encoding between ATM frames to be transmitted over the wireless link by encoding plurality of ATM cells within an ATM cell stream by detecting idle/unassigned cells, assembling an ATM frame having header frame and payload frame, placing the detected idle/unassigned cells in selected portion of the payload frame, adding payload error correction code to the idle/unassigned cells in selected portion of the payload frame, storing an idle/unassigned cell indicator in a first control byte in the header frame, and storing a count of the number of idle/unassigned cells in the payload frame in a second control byte in the header frame.

Claims 14 and 30 meet the criteria set out in PCT Article 33(2)-(4), because the prior art does not teach or fairly suggest an information recording method to be used at receiving end of ATM wireless link relating to original position of moved idle/unassigned cells in an ATM frame and a method of restoring an ATM cell stream sequence after transmission over the wireless link by recording original positions of idle/unassigned cells, moving idle/unassigned cells to new positions at selected portion of ATM frame, and overwriting header bytes of each moved idle/unassigned cell with the recording original positions of each corresponding moved idle/unassigned cell.

Claim 18 meets the criteria set out in PCT Article 33(2)-(4), because the prior art does not teach or fairly suggest a method

**Supplemental Box**

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Boxes I - VIII

Sheet 11

for preserving overhead parity bits present in each received ATM frame to be transmitted over wireless link by flagging a first nibble occurring in each received ATM frame, assembling header and payload frame for transmission, recording position of each flagged nibble encountered, and storing the overhead parity bits occurring in each ATM frame in control bytes contained in the header frame.

----- NEW CITATIONS -----

NONE